How To Choose the Right Detector

by Craig Peterson

On rainy days or when we're starved for laughs, we sometimes stop by the car audio section of a retailer to check out their radar detector display. If we're lucky enough to spot a passing sales associate we're fond of asking him or her to explain the differences between various models. The results are generally nothing short of hilarious. Inevitably the poor dear is reduced to reading off the features listed on each box with absolutely no clue how to choose a good one over a bad one. Which begs the question: If the people who sell these things are powerless to pick a winner over a complete dog, how can the average consumer be expected to make an informed buying decision? Okay, read on and we'll tell you.

What type do I need?

Aside from the traditional corded, dash-mount detector, there are two other types: remote and cordless or battery-powered. Remote radar detectors are a niche market, higher in price ($300-$1,600) and too specialized in design to enjoy a wide following in a market where the typical detector sells for barely over a hundred bucks.

Remote models like Escort Passport SR7 have only a small control/display unit in the cockpit. For the ultimate in concealment, the display can be replaced by single multi-colored status/alert LED built-in to the dash

But for those who feel the need for a built-in detector, highly resistant to theft and, equally important, to official notice by uniformed gents packing guns and badges, there's no substitute for a quality remote model. The downside to a remote is that once it's installed, it remains in the car. No moving it from one vehicle to another.

Those who frequently drive different vehicles, particularly travelers who often find themselves in rental cars, not to mention anyone looking for freedom from a dangling power cord, a **cordless detector** is the answer. They look much the same as a corded model, less the power cord, but are substantially different in design. That's because battery life is a major issue and demands power-saving measures. In essence the detector has a duty cycle in which it's shut down for a percentage of the time. You won't notice this but the truth is, to extend battery life a cordless is sometimes resting and not looking for signals. Net result: less sensitivity. The Escort Solo from the late 1990s, for instance, had barely one-fourth the Ka-band radar warning range of the Passport 8500 model. The new Escort S2 Solo has dramatically closed the gap, but no cordless detector can be

Escort Solo S2

expected to approach the performance of a good corded model—at least not if it's expected to have decent battery life. Decide for yourself if you really need the absolute maximum radar warning range or if cordless operation is more important.

What should I look for?

A detector's attributes fall into two categories: performance and function. Of the two, performance is the more important. One of the

clunkiest detectors on the market, an ancient model that's also the most expensive at $399, still manages to attract a tiny but very loyal following simply because of its excellent sensitivity. Never mind the fact that it has none of the features to be found on units costing a fraction as much; its ability to sniff out a distant radar trap is reason enough to persuade a few to buy it.

At the other end of the spectrum is a host of moderately priced models, many of them stylish, user-friendly pieces with extensive arrays of features. Trouble is, quite a few of them are so **weak in performance**, particularly on Ka band and laser, that we refuse to risk driving with them.

A little known fact is that many of these, regardless of who is selling them, are produced by the same Korean company. Unfortunately, this particular firm is notable more for its low-cost production than for its advanced engineering expertise. This is why so many models—even though they may be wearing the nametag of Cobra, PNI, Whistler or Uniden—perform so similarly.

Sensitive detectors can help you avoid an encounter with instant-on radar.

How do I evaluate a detector's capabilities?

The two most important criteria in radar detector performance are **sensitivity** and **selectivity**. The former refers to the distance at which it's able to pick up the radar signal, also called detection or warning range. Selectivity is the ability to reject non-police radar signals, a crucial task in today's microwave-saturated environment.

The biggest single consumer complaint about detectors is excessive false alarms, a result of poor selectivity. Ever wonder why so many barely-used detectors are auctioned off on eBay? We'd be willing to bet that half of those who've bought a detector quickly grew so weary of constant false alarms that they've either put it on the shelf, never to be used again, sold it or simply given it away.

What produces false alarms? The major offenders are automatic door openers, intrusion alarms and, believe it or not, other radar detectors, particularly the cheap ones. All of these sources generate signals that fall within the bands allocated for police radar.

Sad to tell, many manufacturers are clueless about how to limit the barrage of false alarms. Some take the **Band-Aid** approach, severely chopping sensitivity in City Mode to cut down on urban falses. This works acceptably well in town since most radar encounters are close range affairs, usually a city block or less. But forget to engage Highway mode to restore sensitivity once you're out of town and you'll eventually learn that sensitivity—detection range—is so poor that before it goes off you're likely to run smack into the arms of a waiting trooper.

Superior detectors use advanced software to limit urban falses without major reductions in range. These are the ones to buy. Scan the City Mode scores in our **field tests** and you'll quickly spot these detectors; most will have twice the range or more of the also-rans with their mediocre software.

How much performance do I need?

In motor racing the adage is: Speed costs money; how fast do you want to go? It works the same in radar detectors. Face it, all detectors do the same job—warning of radar and lasers. But they vary widely in sensitivity, a criterion heavily influenced by price. While it's true that a no-frills $49 detector will indeed detect radar, it will do so acceptably well perhaps only 70 percent of the time. The other 30 percent is what you should worry about.

Under perfect conditions—a head-to-head confrontation on flat ground—any decent detector will give adequate warning range, usually one mile or more. But if the radar is over a hill or around a curve, that mile will drop to a few hundred feet, far too little to avoid the long arm of the law. Study our field test scores and you'll note that even the overachievers that give six or more miles of detection range at the Straightaway/Hills test site inevitably find it impossible to spot the radar at the fiendishly difficult Around-the-Curve site from much over a quarter-mile away, still plenty of time to react but only if you're paying attention. An average detector won't spot the radar at all until it's already locked-in your speed.

It's all in the frequency

If you study our test results

you'll notice that most detectors do a fairly decent job of spotting **X- and K-band radar**. That's because those two bands have been around for over a quarter century and the manufacturers have got a handle on how to detect them. Plus, the components used to detect them are plentiful and cheap.

But all bets are off on Ka band. Not only is it a much newer frequency but it's also far more expensive to detect at long range. Bandwidth is a big part of the problem: X band is only 50 megahertz wide and K band just 200 MHz. But Ka band is **2600 megahertz wide**. Instead of looking for a two-story house, the detector now is looking for a quarter lying on a rug somewhere inside the house. To ferret out a signal that could be anywhere in this broad band, a detector spends valuable time scanning back and forth. Net result: lower sensitivity, less detection (warning) range. Now you see why eight miles of range under perfect conditions can drop to as little as 800 feet when the radar is hidden around a curve.

This can be overcome with premium components and superior signal processing--software that tells the detector how to do its job--but that takes resources, too. Once you add the more-expensive components and additional development time to the equation, it's hardly surprising that most manufacturers have been content to **cut corners on Ka band**. They just hope you won't find out about it. Instead, they take the cheap way out, adding frills and furbelows to hype sales.

What Features Do I Need?

The minimum features you'll need are audio and visual band identification, auto mute and dim/dark mode. **Auto mute** automatically mutes an alert after a few seconds, saving you from having to reach over and tap the mute button to silence it.

If the model has an unusually long self-test (on startup it cycles through its complete repertoire of audio alerts) like many Uniden and some Whistler models, and if you tend to be annoyed by the audio barrage every time you start the car, get a model with an **abbreviated self-test** feature. (Most BEL and Escort models have this feature.) Most Cobra models upon startup don't cycle through their unusually long array of audio/visual alerts—up to 11 of them at present—simply because of how long that process takes—and how annoying it would be to listen to this racket every time the car is started. Worse, they don't offer a **tutorial mode** where the detector cycles through all of its audio/visual alerts, allowing you to correlate one with the other. Most Whistler and BEL products offer a tutorial mode and for new users, it's a godsend.

Distinct audio is also high on our list of must-have attributes. If the tones for two or more bands sound nearly alike it'll be nigh impossible to audibly identify the threat. That means you'll have to glance at the visual alerts for that information, not a problem if you're not doing anything important at the moment but a potentially deadly distraction if you're engaged in other tasks, such as driving the vehicle.

The audio alerts must also be **loud enough** to be heard. Fast-driving

Escort Passport can be programmed to skip self-test and power-up quickly

bass-heads who like to crank up the tunes are asking for trouble if the detector can't be heard over the din. Also, take notice of where the speaker is located. These can be marked by a simple hole on the side or top of the case or more likely, a series of holes or slits that conceal the speaker. If it's on the bottom, a seriously dumb location, make certain that you can still hear it when the detector is mounted flush on the dash. If not, you'll have to use the windshield mount exclusively to get acceptable audio volume.

Voice alerts can also be useful since they can eliminate the need to study the visual alerts to figure out what the detector is trying to tell you. They can also be an effective Band-aid for the lousy audio quality on some models. How to tell **good audio** from bad? Power-up the detector and let it cycle through self-test. Watch as it does this, noting which tones corre-

spond to which bands. Repeat this a couple of times to learn the tones. Now try it with your eyes closed. Can't figure out which is which? Don't give up; if the unit has voice alerts, try them as well, they'll probably solve the problem. No voice alerts and you still can't figure out the audio band ID? Keep shopping.

Moderately priced detectors generally use icons or LEDs for their status and alert displays. Different colors are used to make them easier to discern and most such displays are easy to interpret. Models higher in price often have a text display, allowing the detector to literally spell out its warnings and information. Most have eight characters, more than enough for band ID chores. These also allow signal strength to be depicted numerically, say 1 through 9. Some models use the space for a **bar graph** that lights up progressively as signal strength increases. Either of these takes the place of the row of signal-strength LEDs usually found in low-end models. (The original impetus for text displays was to convey safety radar messages, allowing them to pass along urgent information like: "Train Approaching" or "Chinchilla Crossing Ahead!") Is one style better than another? To us, no, but that's strictly a matter of preference.

Text displays and **LED** (light emitting diode) status lights differ in color and effectiveness. Yellow and green are our two least favorite colors—both wash out easily in sunlight. **Red works best**. Some models have an LCD (liquid crystal display) with gray or black alpha-numeric characters against a blue-gray background. This type of display is typically done to conserve battery power in cordless models and offers the least contrast of any style. With the sun coming from behind, most are nearly impossible to read.

A detector's packaging also plays a major part in how easily its

Whistler 1675 alerts to X-band radar

status and alert lights can be seen. Some have their LEDs covered with dark plastic. In low light these work great but glare from the sun when overhead or worse, from directly behind, simply washes them out. A clear case of the triumph of style over function.

Text displays also come in various colors, the most common being red and pale green. Like green LEDs, green text displays are barely better than none at all since they disappear in sunlight. Red fares better but the size and brightness of the text play major roles in their legibility.

Remember that displays vary widely in size and brightness; one that looks perfectly acceptable down at WalMart may prove nearly impossible to see once it's in your car. So when first using your new detector, pay particular attention to the ease with which you can read its information.

Also check out the effectiveness of the mounts. Can the windshield mount easily be adjusted to the angle of the windshield? If not, it will be a hassle to move it to another vehicle. And if it must be bent into alignment, eventually the metal will crack.

And notice if it stays steady, particularly on rough roads. Some windshield mounts **apparently are designed** by people who don't drive. If they did, they'd notice that the detector bounces around nervously, creating a major visual distraction.

We'd also advise that you notice how often it false-alarms and under what circumstances. On multi-

Green text displays can be difficult to read in bright sunlight. When you road-test your new detector, make certain you can read it under all lighting conditions.

lane rural highways does it frequently issue brief, low-signal- strength alerts in reaction to other detectors in passing cars? Recently we tested a model that falsed 39 times during a 52-mile interstate trip in rural country. It was picking up other detectors. By the end of the trip we couldn't wait to rip it off the dash and toss it into the closet. If your new detector exhibits a similar lack of good manners, take it back. It won't improve with age.

Features galore: Are we confused yet?

With a shrinking detector market, all the manufacturers are looking for a marketing edge. While a radar detector once merely detected radar and lasers, today it may also sport a digital compass, a voltage meter or a special alarm to jolt a dozing driver

awake. One manufacturer claims "10-band" and "11-band" protection, another offers Real Voice alerts (as opposed to synthesized voice alerts). With all the hype, it's no wonder that choosing a new car is relatively simple compared to picking out a detector. Here's our take on various features:

360-degree laser detection

The ability to detect a laser from any point on the compass is meaningless in the real world. Visualize a line running axially down your vehicle's centerline and expect an incoming laser beam to be no more than a few degrees off to either side. The devices become inaccurate at greater angles and cease working entirely beyond about 40 degrees off-center.

Auto Mode

High-end BEL and Escort models have a third sensitivity setting, beyond the usual City and Highway modes. In this mode the microprocessor samples the environment to decide how much to reduce sensitivity and reduce annoying false alarms. Due to their extreme sensitivity, this reduction won't be apparent to the average driver. All he'll notice is that the detector hardly ever falses. And it works; the latest units from these manufacturers are almost supernaturally quiet in town.

AccuSweep

A few years ago we had a call from an exec at BEL-Tronics who asked us to verify the common U.S. Ka-band radar frequencies. We listed four of them, only three of which are in widespread use. And we asked him why every manufacturer insists on scanning the entire 2600-Megahertz-wide Ka spectrum when we know full well that only a fraction of the band is actually used by police radar. Plus, the ultra-wide band is highly prone to picking up harmonics, out-of-band signals generated by a host of microwave transmitters including other detectors. This is why most falses are shown as Ka-band signals.

Apparently he listened. A year later BEL introduced AccuSweep, a user-programmable option that instructs the detector to ignore all of Ka save for the areas near where radar guns operate. The result is a phenomenally quiet radar detector.

Frequency Display

BEL calls it "Tech Mode", Escort calls it "Spec Display." In both cases the detector displays the exact frequency of a radar signal. Big deal, you say. But don't dismiss this out of hand, bubba; the information can be invaluable. Here's why. Say you're cruising rapidly, late at night on a lightly traveled interstate. As a car passes in the opposite direction you get a brief Ka-band alert at low signal strength. This is precisely the kind of alert that's generated by a distant trooper working traffic ahead with instant-on radar. What to do?

Knowing that many Ka alerts are the real thing, you need to react instantly. Yet you also need to react appropriately, for your dozing passengers and that guy glued to your back bumper won't be expecting you to lock up the brakes without warning.

But how to tell if it's the real thing? Here's where frequency display comes in. When the alert is displayed, so is the signal's frequency. In this case it's showing 34.567 (the frequency in Gigahertz or cycles per second). And you can safely ignore it. That's because police radar frequencies are strictly controlled by federal law and rarely stray far from the center of their assigned bands. And although there is a very widely used radar model assigned to 34.7 GHz, 34.567 is way too far off frequency to be real. This clearly is a false alarm.

So what caused the alert? It was a harmonic or multiple of the local oscillator frequency used in the other guy's poorly designed radar detector. All superhetrodyne detectors use local oscillators and many operate on either side of a center frequency of 11.55 GHz which, multipled by three, creates a Ka-band signal squarely in the middle of the band.

So that's how we know that this 34.567 GHz signal is bogus. It was a harmonic, the other detector's 11.532 GHz local oscillator multiplied by three. Had it been Ka-band police radar, in this portion of the band it would have been between, say, 34.65 and 34.75 GHz.

Time to nail the brakes: BEL 985 in Tech Mode shows 34.697 Gigahertz signal from deadly Stalker DSR moving radar.

We've used Tech Mode and Spec Display enough now that we're getting to be experts at identifying the LOs of polluting detectors, most of

them cheap imports. Like they say, knowledge is power.

Multiple-Threat Counter

This feature was introduced as the Bogey Counter in 1991 by Valentine Research on their Valentine One model. The old V1, unchanged save for minor software updates, is still for sale and continues to offer the Bogey Counter. A few modern detectors like the Escort Passport 8500 also have this feature (Escort calls it Expert Meter) and will display the number and signal strength of up to nine simultaneous radar signals being received. In theory this can be valuable information since it's possible that more than one radar gun may be operating in the same area. Or a radar gun might be in use near another non-police radar source such as a store's automatic door opener.

Our opinion: given the choice of frequency display or multiple-threat counter—the V1 has only the former, some Escort models have both—we'd take the frequency display. That's because we feel that knowing the frequency is more valuable more often. The hoary old tale of a radar cop hiding near a Safeway, relying on the supermarket's automatic door opener to conceal his radar, is pure fantasy. In all our years of associating with police officers we've yet to encounter one who has used this ploy. (Why bother; there's an unlimited number of available customers, even if he occasionally misses the professional speeder with a high-dollar detector.)

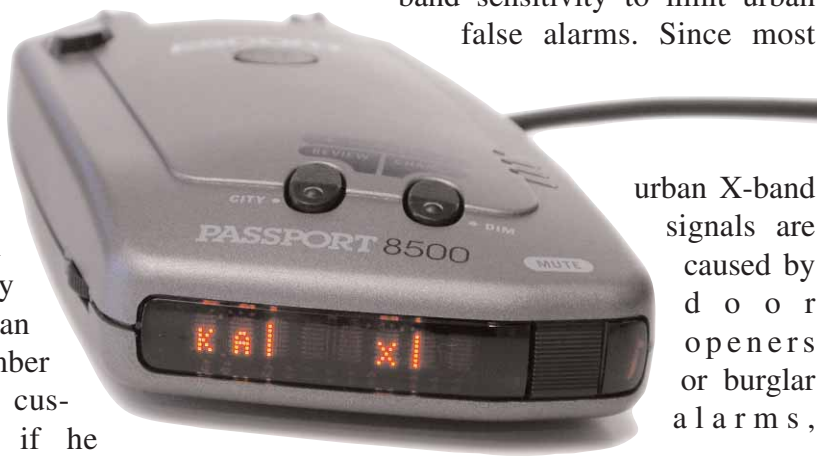
Smart Mute

A Cobra exclusive, this is a software enhancement to limit urban false alarms. To engage the feature, you must power-up the detector and press a button while holding the engine speed to what corresponds to a typical city cruising speed. Once the detector records this engine speed, it automatically mutes radar signals if they're received while the vehicle is below the preset threshold. The theory is, if you're stopped in traffic or driving slowly, why allow an alert to interrupt your day? Good thinking.

Engaging Cobra's clever Smart Mute feature can dramatically reduce urban false alarms, the consumer's Number 1 complaint about detectors.

Alternate City Modes

A Whistler invention, additional city modes further reduce X-band sensitivity to limit urban false alarms. Since most urban X-band signals are caused by door openers or burglar alarms, this can dramatically reduce falses.



Escort Passport 8500 shows equally strong X and Ka-band signals being received.

Selectable Band Defeat

X-band radar has nearly disappeared from the American landscape. In fact, in the past dozen years, in nearly half a million miles of driving, we've encountered only five X-band police radar guns. One was in Ohio, where the highway patrol continues to use some ancient MPH K-55 radar units, three were in Colorado, another state with some ancient K-55s still in service and the last in Utah, where we spotted a Reagan-era Speedgun on the dash of a Highway Patrol commercial-vehicle enforcement Dodge pickup. (This guy was out hunting big rigs although it wouldn't do to blow past him gratuitously.)

Truth is, unless you live in Colorado, Illinois, New Jersey or Ohio—the only holdout states with X-band in service—you're 99 percent safe in disabling X band. Provided, of course, your detector permits this. If it does, you'll note a dramatic decline in the number of false alarms.

High-end BEL and Escort models permit disabling of one or all three bands, making them good choices for operation in countries that don't use X and/or K band. Some Whistlers allow X-band disabling and on the old Valentine One, if you can find instructions buried on their Website, already know which software version it has and have several minutes to spare, you can disable one or more bands. (Don't attempt this on the V1 while driving; it's way too time consuming and dangerous, obviously the reason why the procedure isn't mentioned in the owner manual. On the others it can be done with a simple click-click on the programming buttons.)

Rear Radar Antenna

Any detector will warn of radar coming from behind when the microwave signal reflects back to the detector from metallic surfaces inside the vehicle and from nearby cars, road signs and other structures. One hyper-expensive model has a second antenna pointed toward the rear. But this works only if the detector is mounted squarely in the middle of the windshield with a clear view through the back glass, our least favorite mounting location. Dash-mounted, this detector has little better rearward range than any other model.

Safety Radar reception

There are two types of safety radar, Cobra Electronics' Safety Alert and the Safety Warning System, developed jointly by the other detector manufacturers. The two operate similarly: transmitters mounted on

Escort Passport 8500 has three X-band City modes: normal, Low X and No X, progressively lowering and then eliminating X-band reception.

emergency vehicles or at roadside broadcast coded messages that Safety Alert- or SWS-enabled detectors pick up. Trouble is, there are so few transmitters nationwide that you stand a better chance of being hit by lightning than of receiving a real safety radar alert.

9-band detection (or 10-band or 11-band)

This marketing hype can be credited to the clever folks at Cobra Electronics who, rather than spend big bucks to develop more sensitive detectors, instead created pseudo threats. Their 11-band models, according to the company, can detect no fewer than five radar signals, four laser signals and two safety signals.

Oh, please, let's get a grip here. In the U.S. there are only three radar frequencies and one for laser. As for the two safety signals, one is Cobra's Safety Alert, most of whose transmitters are sitting on storeroom shelves in police departments nationwide and the second is Strobe Alert, claimed to be able to detect the optical transmitters used by some ambulances and fire trucks to change traffic lights to green. Count them all up and voila, an 11-band detector. Is 11-band reception important? Only to a marketing executive. To the average consumer it's simply confusing.

The Road Test

Okay, you've bought a detector and now you're sitting in your car. First decision: where do you mount it? Nearly all detectors come with a strip of Velcro for dash mounting. Others

also have windshield suction cup mounts and a few have visor mounts as well. Given the three options, where should you mount it?

Conventional wisdom dictates that the detector should be as **high above the road** as possible to enhance radar detection. So much for conventional wisdom. In all our years of testing detectors we've never seen one whose range is increased in the slightest by changing its position from the dash to high on the windshield. If you're driving a cab-over Peterbilt, there may be some increase in range but since we don't routinely use 18-wheelers as target vehicles during tests, we can't say.

But we do know that the higher you mount a detector the poorer its laser detection capability. Keep in mind that the favored aiming point for a laser-toting officer is the **front license plate**. In states with no front plate, the grille area or a headlight are popular targets. But in every case the pinpoint laser beam—only 2.4 feet wide at 800 feet—won't reach as high as the dash. Only the faint scatter from the main beam will waft up that high and, if you've got a sensitive detector, cause it to alert. But move it up another two feet to the upper windshield and it will likely fall silent. This is particularly true in trucks and SUVs with their added height.

So keep it where you can both see it and reach its primary controls—and keep it as low as possible. Our least favorite location is in the center of the windshield. Why? Simple: put a detector out in the open and everyone can see it, including inquisitive police officers, passing thieves and detector-poor drivers who see you as their salvation, often glomming onto your bumper and refusing to leave. And

when you exit the vehicle, put it away. If you're using the windshield mount, take that down, too. Leaving it up is a clear message that you've got a detector under the seat, in the console or glove box. Why make a thief's life any easier?

Once you've got your new detector installed, **drive with it** under a variety of lighting conditions: sun low on the horizon behind you, ahead and straight overhead. Can you still make out all the status and alert lights?

If you usually mount the detector directly ahead, in your line of sight, drive with it on a sunny day. Notice any annoying reflections in the windshield from the top of its case? If its case is black, you probably won't. If the case is silver or worse, partly chromed, we can guarantee you'll be watching a mirror image of the detector in the glass all day long. Some won't mind but now would be a good time to make certain it doesn't pose a problem.

And make sure you use it at night, out on a rural road or highway free from man-made illumination. Does its visual display reflect glare onto the windshield? Many detectors' will, causing endless irritation on a long trip. Sure, you can dim or darken the displays on most models but do you really want to do that? Relocating it away from your field of vision will also help but being forced to rely totally on audio alerts is too risky to be recommended.

One last piece of advice: Don't get overconfident now that you're packing a radar detector. Even the best of them are nothing more than driver-information tools. They can help even up the odds but they won't make you invincible.

Rule #1 of detector placement: Put it where you can see and reach it and as low as possible.

Detector Features and Attributes

Must-haves

- High sensitivity (sniffs out radar far up the road ahead)
- Good selectivity (keeps silent except in presence of actual police radar and lasers)
- Distinct audio alerts (helps you interpret what it's trying to tell you)
- Auto mute (automatically shuts off the audio after initial warning)
- Settings memory (retains user preferences between uses)

Very desirable

- Selectable band defeat (shut off radar bands unused in your area to limit falses)
- Voice alerts (fail-safe threat ID without having to study the visual alerts)
- High-resolution text display (easier to see under all lighting conditions)
- Alternate City Modes (reduce X band sensitivity or shut it off to limit falses)
- Abbreviated self-test (avoids the irritating self-test audio alerts at start-up)
- Tutorial (cycles through audio/visual alert repertoire to facilitate learning them)
- Frequency display (lets savvy drivers react appropriately to alerts)

Meaningless, Worthless or Both

- 9-, 10- or 11-band protection (come on, there are only four frequencies in use)
- 360-degree Laser (if it's not coming from dead ahead or behind, it can't hurt you)
- Safety Radar (you have a better chance hearing from Elvis than from one of these transmitters)

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